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UNITED STATES GENERAL ACCOUNTING OFFICE

WASHINGTON, D.C. 20548

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Procurement and Systems  
Acquisition Division



B-163074

The Honorable  
The Secretary of Defense

Attention: Assistant Secretary of Defense  
(Comptroller)

Dear Mr. Secretary:

On April 7, 1971, we advised you that the General Accounting Office was initiating a survey of Navy test and evaluation activities (GAO Code 77106). During this survey we noted a questionable acquisition of data processing capabilities which we are calling to your attention.

The survey was conducted at the Naval Air Development Center (NADC), Warminster, Pennsylvania. We also visited offices of the Chief of Naval Operations and the Chief of Naval Material (CNM), which are concerned with the review and approval process for acquiring automatic data processing (ADP) equipment.

The situation in question involves an ongoing procurement by the center of three computer systems to provide increased technical capability for processing multiple real-time simulations concurrently with other applications. The systems are being installed in two phases. In Phase I, two of the systems are installed and being used on a limited basis prior to formal acceptance. The Phase II plans call for installation of the third system in 1975 to handle an expected increase in workload.

Our reasons for (1) questioning whether the center's need for the increased technical capability is justified by the expected workload and (2) suggesting consideration of alternative ways of providing the needed capabilities, are discussed below.

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#### NADC'S COMPUTER FACILITIES

The center's central computers and related equipment are used for such applications as real-time weapons simulations, scientific problem solving, and general business information processing. The principal users are the Systems Analysis and Engineering Department, the Aero Electronic Technology Department, and the Programs and Financial Management Department.

In real-time simulation, digital computers may be used in conjunction with analog equipment and mock-up aircraft cockpits operated by pilots in order to perform evaluations of air combat duels. Many simulations, including scientific problem solving, do not require real-time data processing; for example, the processing of operational data gathered at military exercises. Other applications include data reduction and processing industrial fund accounting.

These applications have been performed by five electronic system simulators and three digital computers--a CDC 3200, a CDC 3300, and an IBM 360/65. The purpose of the ongoing procurement is to replace the digital systems with three CDC 6600 systems. So far, the CDC 3200 and 3300 have been replaced by the first two CDC 6600 systems. Formal acceptance of the new systems is expected by May 1972.

#### JUSTIFICATION AND APPROVAL OF THE CDC 6600 PROCUREMENT

In October 1969, the Navy's Automatic Data Processing Equipment Selection Office (ADPESO) issued to 39 vendors a request for proposal for an ADP system that would provide the center with capabilities for concurrent, multiple real-time simulations and for multiprogramming. The system was also to provide increased capacity for remote programming and inquiry and for real-time data processing. Only one vendor, Control Data Corporation (CDC), replied. ADPESO found that CDC's proposal to furnish CDC 6600 systems was acceptable.

In February 1970, the Deputy Secretary of Defense stopped the acquisition of certain ADP systems and requested economic analysis and documentation of need and alternative methods to satisfy need. Accordingly, the Navy directed CNM to review NADC's pending system acquisition. Based on this review, the Navy approved the acquisition and on September 15, 1970, the General Services Administration awarded a contract to CDC.

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As modified, the contract calls for Phase I installment purchase of the first two CDC 6600 systems and Phase II lease of the third system (see page 1). The cost of these systems, if purchased outright, would amount to about \$10.6 million.

NADC is also constructing, at an estimated cost of \$3.9 million, an advanced Navy Air Combat Evaluation testing device for use with the two CDC 6600's to provide real-time manned combat simulations of two aircraft. Completion is expected in 1974. According to NADC, this device will provide improvements over other known devices in simulating visual scenes for the pilots.

NEED FOR NEW EQUIPMENT TO MEET  
NADC'S REQUIREMENTS

Based on our initial review of NADC's computer replacement program, questions arise which fall into three areas:

- The consideration given in the justification and review process to alternatives available for satisfying the need for additional capability and the economic implications of the alternatives,
- The magnitude of NADC's need for ADP capability in relation to its workload experience since review and approval actions, and
- Other factors which may have impact on NADC's future use of the new equipment.

Alternatives for meeting NADC's requirements

Approval of the acquisition was apparently based on the principal conclusion of the 1970 CNM system review, i.e., that NADC's computers were not considered adequate to satisfy projected ADP requirements, particularly in the area of the installation's stated need for technically sophisticated equipment. The equipment being replaced had been providing real-time simulation capability.

The reason for the first two new systems was the need to increase technical capability for processing multiple real-time simulations during prime shift hours, concurrently with other applications.

The commitment for later acquisition of the third new system was based on (1) past experience, showing that future workloads would increase at a rate which would saturate the first two systems

within 3 years, and (2) the position that when expansion was necessary an undesirable delay might occur unless the contractor eventually selected was obligated to provide a third system by the initial contract.

In regard to the Deputy Secretary's requirement for economic analysis, we were advised that a "total new system" approach was taken for considering cost/benefit alternatives which would satisfy NADC's stated future ADP requirements. This approach did not consider the use of existing equipment to meet future requirements. Therefore, only two alternatives were considered feasible; either acquire suitable equipment for NADC or obtain equivalent computing power from commercial sources at substantially higher cost.

It seems to us that a critical review should have considered the cost/benefit merits of such other alternatives as:

- use of terminals to share the time of ADP resources at other Government facilities, or
- expansion or modification of equipment already operating at NADC, or
- performing portions of the real-time simulation work at Government locations which already had that type of capability.

We were advised that the Navy's review did not consider time sharing because electrical transmission delay might impair real-time simulation where man is an integral part of the problem. An analysis of NADC's central facility workloads for fiscal year 1971, however, indicates that the processing of real-time problems accounted for only about 10 percent of total processing time. Accordingly, it would have been appropriate to consider time sharing for applications other than real-time problems which formed, and apparently continue to form, the bulk of NADC's workload.

We found no explanation in the report of the Navy's review as to why NADC's existing equipment could not be modified or **expanded** when needed to accommodate changes in the installation's ADP needs.

In our opinion, consideration of these and perhaps other alternatives would have provided a more complete economic analysis and additional options.

NADC's forecast of data processing workload

During the 1970 CNM system review it was noted that the use of digital computers had recently shown a sharp increase and that a saturation point had been reached. In reviewing use records<sup>1</sup> for the three existing digital computers (see page 2) from January 1969 through March 1971, we observed that the growth trends noted at the time of the CNM review did not continue as expected and that some capacity was available for additional workloads, as indicated by the following:

- Except for the IBM 360/65 there was no noticeable growth in equipment use. Use of the IBM equipment roughly doubled from January 1969 to the point of the CNM review. Immediately after the review, utilization of this equipment declined sharply. We were able to associate this fluctuation with the changing workload for one development program.
- Average monthly use on an equipment-by-equipment basis for the three computers over the 27-month period ranged from 26 to 40 percent less than the highest single month of productive use which had been achieved for each computer.

The Navy, in justifying the acquisition, emphasized the need for added simulation and scientific problem solving capability. However, the use records for the January 1969 - March 1971 period showed, as discussed below, a trend away from technical use toward general business data processing.

- The Systems Analysis and Engineering Department, which historically has been the principal user of the facility for simulation and scientific problem solving, has experienced a significant and prolonged decrease in both computer use and relative portion of the total facility workload.

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<sup>1</sup>Our analysis was based on NADC equipment utilization reports for 27 months of normal workload which excluded periods involving system additions or deletions. These reports show clock hours of productive and nonproductive use.

--Conversely, the primary user for general business data processing, the Programs and Financial Management Department, has shown a prolonged increase in both use and share of the total workload.

Expressed quantitatively, the Systems Analysis and Engineering Department's share of total facility use declined from 43 percent to 33 percent during the 27-month period reviewed, while Programs and Financial Management Department's share increased from 11 percent to 20 percent.

It seems that the large increase in capability to be provided by the new equipment will not be effectively used unless there is a reversal of these workload trends.

#### Other factors which may affect NADC's needs

We noted two factors bearing on both the nature and extent of NADC's future ADP workload, i.e., (1) the extent of simulation capabilities available within DOD installations or held by contractors and (2) the outcome of an ongoing study of possible consolidation of research, development, test and evaluation (RDT&E) activities at the Eastern Test Range (ETR), Patrick Air Force Base, Florida.

#### Other simulation facilities

During a previous GAO review,<sup>1</sup> DOD identified for us more than 300 Government and contractor data processing facilities that conduct computer simulations. This should provide a significant resource for simulation workloads. In this regard, the previously mentioned Air Combat Evaluator may be in competition for new workloads with such other simulation tools as available; for example, at the National Aeronautics and Space Administration's Langley Research Center and at least two Navy aircraft contractors. Like NADC's, the Langley Research Center's simulator is controlled by dual CDC 6600's and provides maneuvering simulation of two mock-up aircraft flown in air-to-air combat.

#### The Lower Atlantic Test Area study

As a part of an effort to improve the RDT&E facilities base, the Deputy Secretary of Defense initiated a study in October 1971 to improve the cost effectiveness and test capability of the ETR.

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<sup>1</sup>Results of the review are reported in B-163074 House Appropriations Committee dated 2/23/71, and titled "Computer Simulations, War Gaming, and Contract Studies."

A principal objective of the study is to identify activities in the Atlantic area which could be relocated to the ETR, including those involved with testing of aircraft, ships, missiles and related equipment. Recommendations are to be reported by July 15, 1972.

The recommendations could result in relocation of NADC, or portions of it, and other Navy installations either directly or indirectly related to NADC's programs and reduction of NADC's ADP workload.

#### CONCLUSIONS AND RECOMMENDATIONS

The matters discussed in this report indicate, in our opinion, a need for validation by top-level management of NADC's need for increased ADP capabilities and of the decision to procure or lease new equipment to meet the need. We believe that the ADP acquisition ought to be reassessed to assure appropriate matching of workloads with existing equipment and such other alternatives as time sharing to obtain savings which might be achieved by scaling down the current acquisition.

We suggest that the Department of Defense reassess NADC's forecasts of data processing workloads to determine whether the capabilities provided by the CDC 6600 systems would be fully used. The reassessment should include consideration of the following questions and alternatives:

- whether recently experienced data processing workloads have been or should be analyzed through computer performance evaluation techniques, including the use of monitoring devices,
- the extent of need for multiple real-time simulations versus routine ADP applications which should be considered for possible time sharing or processing on less sophisticated equipment whether located at NADC or elsewhere,
- whether it is practical and desirable to scale down the acquisition program or, if not,
- whether requirements of other DOD activities or contractors could be economically served by NADC's capability for real-time simulation, or

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--whether a portion of the CDC 6600 system can be diverted to satisfy new or replacement equipment needs of other activities.

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The Joint Economic Committee has expressed a continuing interest and concern for the adequate use of ADP equipment. GAO plans to incorporate the matters discussed above in an overall report to the Committee on this subject. We would therefore appreciate receiving within 30 days your comments and any information you consider pertinent to the matters discussed in this letter as well as any additional information regarding plans for use of the ADP facility.

Since this report contains recommendations for your consideration, copies are being sent to the Appropriations and Government Operations Committees of both Houses of the Congress under the provisions of Section 236 of the Legislative Reorganization Act of 1970. Copies also are being sent to the Armed Services Committees.

Copies of this letter are also being sent to the Director of Defense Research and Engineering and to the Secretary of the Navy.

If you desire, we will be glad to discuss these matters with you or your representatives.

Sincerely yours,

  
Director

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